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DISTRIBUTION OF SEEDS AND PLANTS BY THE
DEPARTMENT OF AGRICULTURE.

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[Cir. 100]

DISTRIBUTION OF SEEDS AND PLANTS BY THE DEPARTMENT OF AGRICULTURE.

INTRODUCTION.

The purchase and distribution of seeds and plants by the Government may be said to date back to colonial days. As early as 1743 the British Parliament granted \$600,000 to promote the cultivation of indigo and other crops in the American Colonies, and the assemblies of various Colonies appropriated small sums from time to time to encourage the cultivation of plants new to the country, such as hops in Virginia, mulberry trees for silk culture in Georgia, and vineyards for the establishment of an American wine industry.

Franklin, while in England as agent for Pennsylvania, sent home silkworm eggs and mulberry cuttings. Thomas Jefferson during the five years he represented this country as minister to France (1784-1789) forwarded numerous seed samples of grasses, rice, peppers, and olives to correspondents at home, especially to the Society for the Improvement of Agriculture at Charleston, S. C. It was to this society that he sent samples of rice seed, from which some of the best rice in the world was raised in the Carolinas. Other representatives of our Government in the early days of its history followed the example of Franklin and Jefferson, until during the administration of John Quincy Adams instructions were given to all United States consuls to forward rare plants and seeds to Washington for distribution. A botanical garden was later established at Washington, in which were grown many of the rare and interesting plants imported from foreign countries, and considerable quantities of such seeds and plants were distributed by the Commissioner of Patents.

Notwithstanding these efforts to introduce new seeds and plants, many varieties of fruits and vegetables with which we are familiar were scarce or unknown in the early part of the nineteenth century. There were but few seed farms, nurseries, or seedsmen, and the illustrated seed catalogues of our day were unknown. Seeds were mostly grown by the farmers themselves and there was no improvement from year to year. Interest in better seeds and in securing new seeds and plants resulted largely from the agricultural fairs inaugurated by the various societies for "promoting agriculture" which were

organized at Charleston (1784), New York (1785), Philadelphia (1791), Boston (1792), and Washington (1809).

In 1839, through the efforts of Hon. Henry L. Ellsworth, Commissioner of Patents, an appropriation of \$1,000 was made for the purpose of collecting and distributing seeds, prosecuting agricultural investigations, and procuring agricultural statistics, with which 30,000 packages of seeds were purchased and distributed. This appropriation marks the beginning of our present Department of Agriculture. Similar appropriations continued to be made, increasing in amount from year to year as the importance and value of the work came to be recognized, but prior to 1865 the appropriations were always for the combined purposes of purchasing seeds and collecting statistics, so that the actual amount expended for seeds alone can not be determined. From 1839 to 1862 the work was handled by a small force of clerks in the Patent Office, but in 1862 it was transferred to the newly created Department of Agriculture. For 40 years thereafter the work was carried on by a group of employees known as the "Seed Division," until 1901-2, when various affiliated but hitherto independent branches of the Department were brought together to form the present Bureau of Plant Industry. During the period of 72 years from 1839, when the first appropriation of \$1,000 was made, to 1911, when \$289,680 was appropriated, the quantity of seed distributed has steadily increased and the methods of handling it have undergone many changes.

OBJECT OF THE DISTRIBUTION.

The law under which the Department of Agriculture was organized provides—

There shall be at the seat of Government a Department of Agriculture, the general design and duties of which shall be to acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word and to *procure, propagate, and distribute among the people new and valuable seeds and plants.* (Sec. 520, R. S.)

There can be no doubt that the purpose of the earlier legislation for the purchase and distribution of seeds was to introduce into this country new and improved varieties of vegetables, fruits, flowering plants, and new crops in order to increase the horticultural and agricultural products of the United States, and for many years attempts were made to confine the distribution to new varieties of vegetables, grains, sorghums, and fruits. The distribution of such seeds has undoubtedly left a decided impression upon the agriculture of this country. As the demand for the new seeds and plants introduced by the Department increased, however, such demand very naturally found expression in requests made to Senators, Representatives, and

Delegates in Congress, and the number of these requests soon became so great that it was impracticable to fill them with strictly new varieties of seeds. The practice of sending out larger and larger quantities of vegetable seeds thus developed. These seeds, while in no wise new, were useful in the new communities to which they were largely sent.

During the years from 1839 to 1893 practically the entire seed appropriation was expended for standard varieties of vegetable and flower seeds. In 1894 a change was advocated and action was taken to discontinue the customary distribution. This action was not approved by Congress, which in the act approved April 25, 1896, changed the wording of the previous acts, which for many years had read "for the purchase, propagation, and distribution, as required by law, of valuable seeds," etc., to read as follows:

For the purchase, propagation, and distribution of valuable seeds, bulbs, trees, shrubs, vines, cuttings, and plants, and expense of labor, transportation, paper, twine, gum, printing, postal cards, and all necessary material and repairs for putting up and distributing the same, and to be distributed in the localities adapted to their culture, one hundred and fifty thousand dollars. *And the Secretary of Agriculture is hereby authorized, empowered, directed, and required to expend the said sum in the purchase, propagation, and distribution of such valuable seeds, trees, shrubs, vines, cuttings, and plants, and is authorized, empowered, directed, and required to expend not less than the sum of one hundred and thirty thousand dollars in the purchase at public or private sale of valuable seeds, the best he can obtain, and such as shall be suitable for the respective localities to which same are to be apportioned and in which the same are to be distributed as hereinafter stated, and such seeds so purchased shall include varieties of vegetable and flower seeds suitable for planting and culture in the various sections of the United States.*

Under the wording of this act the Attorney General, to whom the question was submitted for decision, held that the purchase and distribution of seeds, including vegetable and flower seeds, were mandatory and left the Secretary of Agriculture without discretion.

THE CONGRESSIONAL DISTRIBUTION.

Because the purchase and distribution of seeds and plants by the Department of Agriculture is specifically appropriated for by Congress, and because of the wording of the appropriation acts, which provide that "an equal proportion of five-sixths of all seeds, bulbs, shrubs, vines, cuttings, and plants shall, upon their request, after due notification by the Secretary of Agriculture that the allotment to their respective districts is ready for distribution, be supplied to Senators, Representatives, and Delegates in Congress for distribution among their constituents or mailed by the Department upon receipt of their addressed franks," the distribution of such seeds and plants is commonly designated as the "congressional seed distribution."

VEGETABLE AND FLOWER SEEDS.

The most prominent feature of this distribution for several years, in fact since 1896, has been the purchase and distribution of standard varieties of vegetable and flower seeds, which alone can be secured in sufficient quantities to meet the requirements of the law. The quota of each of the 487 Senators, Members, and Delegates in Congress for the past three years has been 20,000 packages of vegetable and 2,000 packages of flower seed, each package consisting of five packets containing different kinds of seed. The Secretary's quota for distribution direct to miscellaneous applicants, including State agricultural experiment stations, schools, hospitals, army posts, crop reporters, co-operators, and American citizens in foreign countries, was 1,000,000 packages of vegetable and 150,000 packages of flower seeds. Provision was also made whereby Members of Congress could exchange their vegetable seed for an equal number of flower-seed packets, or vice versa, to enable them to adjust their quotas to the demands of their constituents. The number of packets provided in the last distribution, which began December 2, 1911, and ended April 19, 1912, was 51,138,240 packets of vegetable seed and 12,226,315 packets of flower seed, or a total of 63,364,555 packets. The kinds and quantities of seed included in this distribution are shown in Table I.

TABLE I.—*Vegetable and flower seeds distributed in the year 1911-12.*

Vegetable seeds.			Flower seeds.	
Kind.	Number of varieties.	Quantity.	Kind.	Quantity.
		<i>Pounds.</i>		<i>Pounds.</i>
Bean (pole).....	9	25,070	Ageratum.....	5
Beet.....	8	25,699	Antirrhinum.....	354
Brussels sprouts.....	3	3,740	Aster.....	168
Carrot.....	5	19,450	Balsam.....	378
Collards.....	1	7,495	Calendula.....	1,750
Corn.....	6	325,472	Candytuft.....	2,052
Cucumber.....	3	11,259	Castor bean.....	100
Endive.....	3	8,383	Celosia.....	8
Kale.....	1	4,008	Cosmos.....	1,181
Kohl-rabi.....	2	1,832	Dianthus.....	807
Lettuce.....	8	73,043	Eschscholtzia.....	580
Muskmelon.....	7	22,890	Kochia.....	1,427
Okra.....	3	9,094	Mignonette.....	1,798
Onion.....	4	20,512	Morning-glory, dwarf.....	447
Parsley.....	2	5,305	Morning-glory, tall.....	3,425
Parsnip.....	2	10,482	Nasturtium, tall.....	11,572
Pea.....	9	174,600	Pansy.....	124
Radish.....	12	132,336	Petunia.....	158
Squash.....	3	7,500	Poppy, double.....	1,407
Tomato.....	8	14,215	Poppy, single.....	1,172
Turnip.....	6	25,945	Portulaca.....	349
Watermelon.....	20	19,155	Sweet pea.....	17,000
			Zinnia.....	1,608

The total weight of the vegetable and flower seeds alone was 994,116 pounds, or over 497 tons, enough to fill 20 freight cars.

In planning a distribution the country is divided into sections, as shown in figure 1.

Nearly all varieties of flower seed included in the distribution and such vegetables as lettuce, radish, onion, pea, bean, beet, carrot, parsnip, turnip, tomato, and cucumber will thrive at different seasons in all sections. Such vegetables as okra and collards are distributed only in section 1. On the other hand, sweet corn, which is in much demand in sections 3, 4, and a portion of section 5, is not distributed in section 1, because it is likely to be destroyed either by insects or fungous diseases. Such seeds as watermelon and muskmelon are not sent into the extreme North.

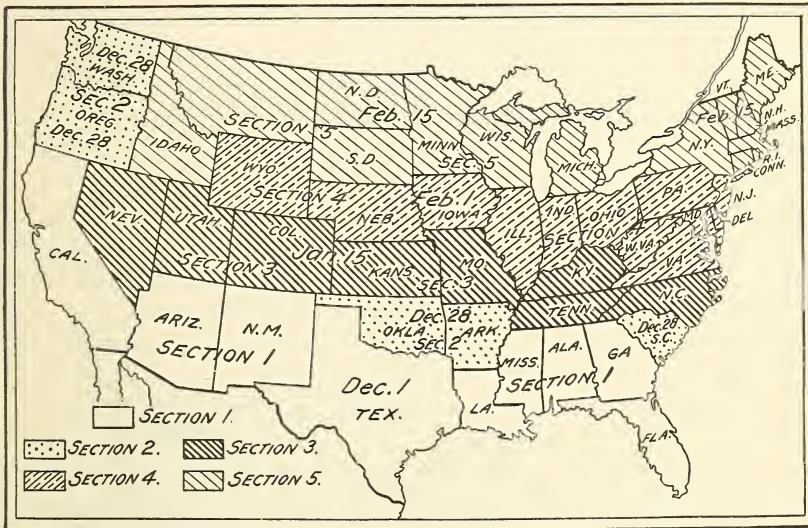


FIG. 1.—Sections into which the United States is divided for the distribution of vegetable seed.

HOW SEEDS ARE PURCHASED.

All seeds are purchased through competitive bids obtained in the spring from the principal seed growers and dealers in the country, about 200 being requested to submit quotations. The quotations are opened and listed in the presence of such bidders as care to attend by the Department board of awards, of which the chief clerk of the Department is the chairman, and referred to the Bureau of Plant Industry for the advice and recommendations of seed experts, in accordance with which recommendations purchases are made by the board. In awarding contracts the board disregards varieties unsuitable for distribution, as well as bids of growers or dealers who in the past have failed to carry out their contracts satisfactorily. When the lowest price is not accepted in any case the reasons therefor are stated

in writing as a part of the permanent record. Approximately 25 per cent of the seeds are purchased from surplus stocks grown the previous year, and the remaining 75 per cent are grown under contract for the Department during the current season, thus insuring that the seeds shall be fresh and of strong vitality.

HOW SEEDS ARE TESTED.

All purchases are made subject to satisfactory appearance, viability (germination), and trueness to varietal name or type. The testing of samples of seed to ascertain its viability is done by experts in the Seed Laboratory of this Bureau, both before and after the shipment of the bulk seed. When a consignment of seed is received at the warehouse a small portion is taken from the middle and near the top and bottom of at least one-fourth of all bags and thoroughly mixed to make a composite sample, which is then sent to the seed laboratory. From the sample 100 or 200 seeds are counted out and placed between moist blotters in a germinating chamber, which is really an incubator fitted with automatic devices for keeping the blotters moist and for regulating the temperature to suit the requirements of different kinds of seed. At the end of a week or more, depending on the kind of seed, the blotters are examined and the number of seeds which have sprouted are counted to determine the percentage of germination. As the result of these tests many thousands of pounds of vegetable and flower seeds which fail to meet the requirements of the Department as to viability are rejected annually. Table II and III show the average percentage of germination of all vegetable the flower seeds purchased by the Department for distribution during the past 11 and 10 years, respectively, and the viability of so-called "commission" seeds¹ (vegetable²) purchased in the open market, during the past 4 years.

¹ "Commission" seeds are usually put up in packets and sent out to dealers for sale by them on a commission basis, all seed not sold at the end of the season being returned to the seed-packing house.

² Purchase of "commission" seeds by agents of the Department have been confined to vegetables, so that no data for flower seeds of this class are available.

TABLE II.—*Germination tests of vegetable seeds purchased for congressional distribution compared with "commission" seeds purchased in the open market.*

Kind.	Congressional seeds for 11 years.		"Commission" seeds for 4 years.	
	Number of samples tested.	Average ¹ germina- tion.	Number of samples tested.	Average ¹ germina- tion.
		<i>Per cent.</i>		<i>Per cent.</i>
Bean, dwarf.....	171	95.8	565	77.8
Bean, pole.....	72	96.8		
Bean, Lima.....	21	91.8	64	71.6
Beet.....	172	81.5	508	73.4
Brussels sprouts.....	20	84.5		
Carrot.....	65	71.9	638	44.9
Collards.....	21	87.3		
Corn.....	206	86.4	312	64.8
Cucumber.....	90	89	1,043	65.7
Endive.....	31	80.1	114	56
Kale.....	37	85.9	123	54.5
Kohl-rabi.....	19	88.7	100	52
Lettuce.....	228	95.2	1,185	74.9
Muskmelon.....	121	88.1	537	55.2
Okra.....	66	85.7		
Onion.....	54	85.9	710	43.1
Parsley.....	68	68.3	118	32.6
Parsnip.....	56	75.7	294	22.6
Pea.....	115	93.2	526	60.1
Radish.....	271	95.5	1,371	72
Squash.....	121	92.2	785	52.3
Tomato.....	81	87.2	848	66.8
Turnip.....	55	94	852	67.3
Watermelon.....	210	86.3	652	60.5
	2,371	88.7	11,345	58.41

¹ Determined by multiplying the yearly germination by the number of samples and dividing the sum of the products by the total number of samples.

TABLE III.—*Germination tests of flower seeds purchased for congressional distribution.*

Kind.	Number of samples tested.	Average ¹ germina- tion for 10 years.	Kind.	Number of samples tested.	Average ¹ germina- tion for 10 years.
		<i>Per cent.</i>			<i>Per cent.</i>
Ageratum.....	21	57.5	Kochia.....	22	65.2
Antirrhinum.....	29	63.4	Morning-glory.....	55	71.8
Aster.....	26	64.4	Nasturtium.....	59	69
Balsam.....	30	94.3	Mignonette.....	40	63.2
Calendula.....	54	73.8	Pansy.....	14	55.2
Candytuft.....	58	75.4	Petunia.....	45	63.1
Castor bean.....	11	72.9	Poppy.....	83	66.2
Celosia.....	6	71	Portulaca.....	16	77.4
Cosmos.....	41	73.2	Sweet pea.....	26	89.4
Dianthus.....	44	87	Zinnia.....	45	81.6
Eschscholtzia.....	51	58.7			

¹ Determined by multiplying the yearly germination by the number of samples and dividing the sum of the products by the total number of samples.

The high average percentage of germination of Government seeds, as compared with "commission" seeds, is to be expected in view of the high standard maintained by the Department and the rigid tests to which all samples are subjected before acceptance.

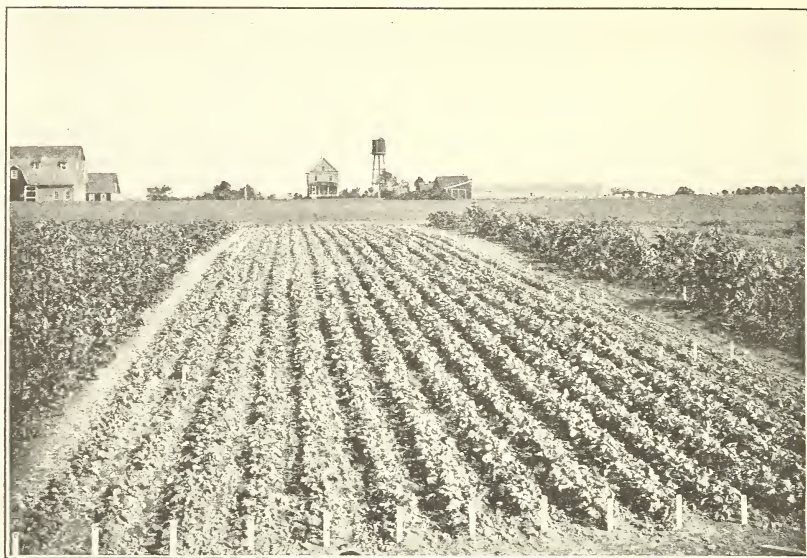


FIG. 2.—Testing vegetable and flower seeds at the trial grounds of the Arlington Experimental Farm, Va.



FIG. 3.—Testing vegetable seeds in the greenhouses at the Arlington Experimental Farm, Va.

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In addition to the test for viability, samples of each lot of seed are tested by the horticulturist of the Bureau and his assistants on the trial ground of the Department at the Arlington Experimental Farm in Virginia. Here also is tested a more or less complete collection of varieties of vegetable and flower seeds, especially new strains or novelties offered by seedsmen in their spring catalogues. (See figs. 2 and 3.) In the case of seeds grown for the Department under contract, the seed fields are inspected at the proper season by experts and rogued (that is, plants not true to type are removed) if necessary, or if too badly mixed for roguing the contract is canceled. After harvest samples of the seed are tested the same as those from surplus stocks. It is the aim of the Bureau to have its seed experts visit all the principal seed-growing sections and keep well informed as to the quality and purity of stocks of the different growers throughout the country. If the stocks of any grower are found to have deteriorated or have become mixed, no purchases of such stocks are made thereafter.

WHERE SEEDS ARE GROWN.

Most vegetable seeds and many of the flower seeds are grown in this country, seed growing as a business having assumed large proportions within recent years. Formerly most of the seed produced in the United States was grown within 100 miles of New York City, that is, in Connecticut, on Long Island, in eastern Pennsylvania, and in New Jersey. In the last 50 years, however, the business has extended across the continent. Lettuce and radish, the two largest items in the congressional distribution, are grown in California, which leads the world in their production. (See figs. 4 and 5.) Notwithstanding the large quantities of flower seed produced in California, most of the American supply continues to be grown in Europe (especially in Germany and France) and northern Africa, where it can be produced at less expense than in this country. The principal vegetable and flower seed-growing districts of the United States are shown in figure 6. Varieties not indicated on the map are procured in Europe.

HOW SEEDS ARE PACKETED AND MAILED.

The vegetable and flower seed which is found satisfactory and accepted for distribution is shipped into Washington during the late fall and winter months, where it is packaged, assembled, and mailed by contract. This contract includes labor, printed packets and envelopes, filling packets and placing them in the envelopes, sealing, franking, and hauling to the post office or direct to the mail cars. The packaging is done by machines, which automatically measure

the exact quantity of seed required for a packet, seal the packets, and drop them into hoppers which lead to bins on the floor below.



FIG. 4.—A 20-acre seed field of sweet peas in the Santa Clara Valley, Cal.



FIG. 5.—A 250-acre lettuce seed field in the Santa Clara Valley, Cal.

Each of these machines will put up from 25,000 to 35,000 packets a day, and 20 machines are in use from December 15 to April 15, turning out steadily about 1,250 packets per minute. (See fig. 7.)

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The five packets containing the different kinds of seed which go to make up a "combination" are then assembled in addressed en-

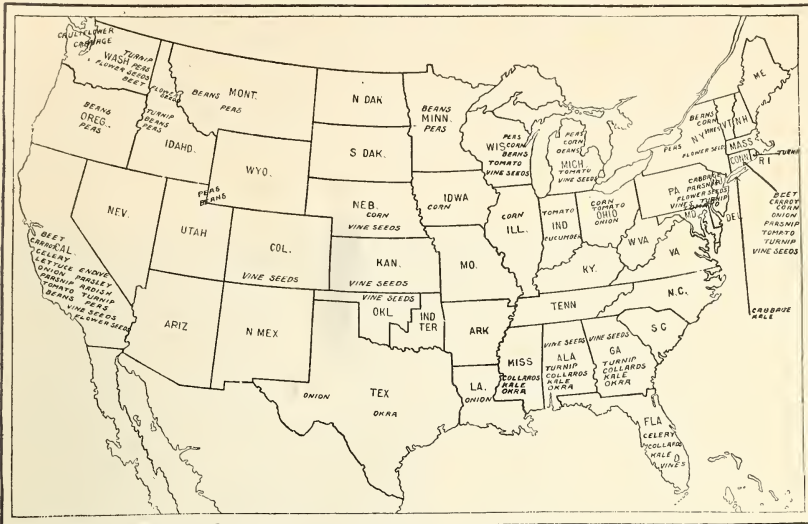


FIG. 6.—Map of the United States, showing the principal sections where vegetable and flower seeds are grown.

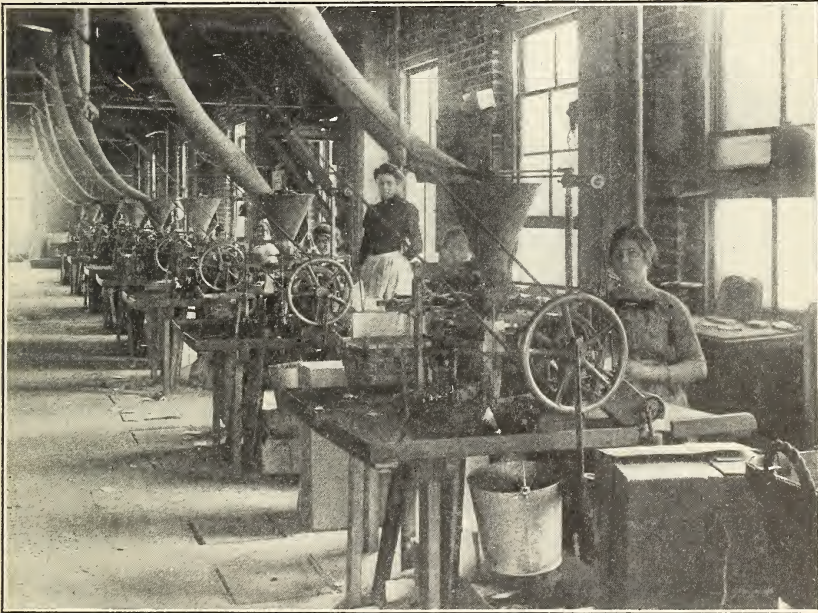


FIG. 7.—Automatic seed-planting machines.

velopes (which are then called packages) by operators who sit before moving endless belts in front of the seed bins, each operator

handling only one kind of seed. When the envelopes reach the end of the belt they pass through machines which automatically seal them at the rate of 30,000 a day. The seed warehouse is equipped with four of these belts and four sealing machines, and the daily output of 120,000 packages is mailed to the addresses furnished by Senators and Members of Congress at the rate of about 250 a minute. (See fig. 8.) In the old days, before the automatic packeting machines were developed, the seed was put into the packets with spoons by a large force of girls employed each winter.

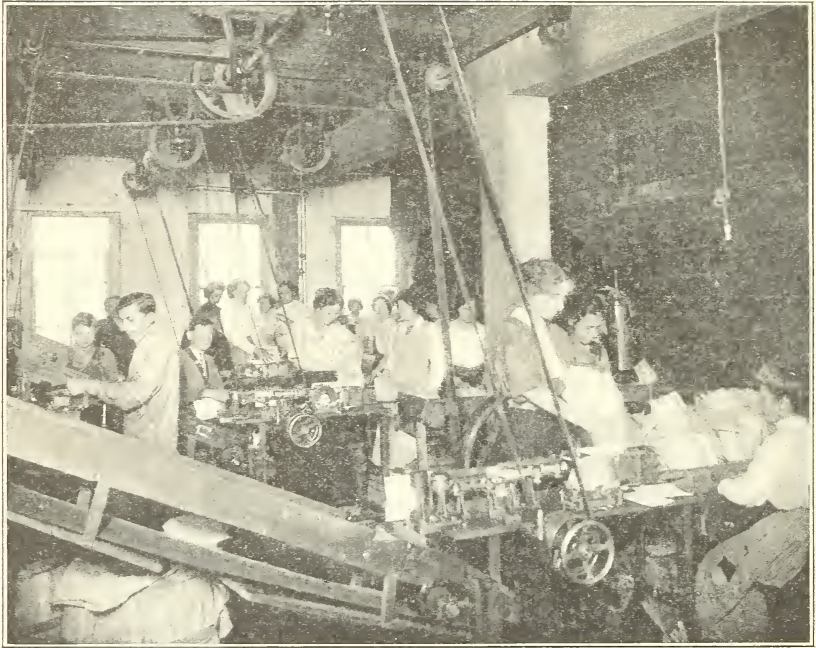


FIG. 8.—Machines for automatically sealing envelopes containing seed packets.

MISCELLANEOUS SEEDS AND PLANTS.

About 90,000 strawberry plants of standard varieties are also distributed annually upon congressional requests.

Of grapevines about 6,000 are distributed in the Southern States, and about 18,000 are sent into the Middle and Northern States.

For the Southern States also from 3,000 to 4,000 citrange plants are provided annually. The citrange is a hybrid propagated from a cross between the Florida sweet orange and the Japanese *Citrus trifoliata*, which was effected by plant breeders of this Bureau several years ago with a view to originating a variety that would prove hardy and resistant to cold north of Florida. The Japanese *trifoliata* is a true orange and is hardy as far north as New York, but

its fruit is not edible. The citrange resulting from this cross is hardy as far north as North Carolina on the east and Washington on the Pacific coast. Its fruit resembles an orange in appearance, but the juice is like that of a lemon.

For many years Dutch bulbs (hyacinths and tulips) and narcissuses have been included in the congressional distribution. As it is believed that these bulbs can be grown in this country equal to those imported by commercial dealers at a cost of more than \$500,000 annually, a propagating garden was established by the Department in 1908 near Bellingham, Wash., where conditions are especially favorable. This garden was established not only for the purpose of supplying bulbs for distribution but of securing accurate information regarding their propagation and culture and if possible demonstrating that they can be grown successfully and profitably on a commercial scale. While the results so far secured are very encouraging, it is entirely too soon for the Department to attempt to supply information regarding methods and cost of growing them. The bulbs which are grown at the garden are not for sale or distribution but will be retained for further propagation until such time as the natural increase is sufficient to supply the quantity required for the regular distribution.

Trial sets of different varieties of imported bulbs, Virginia-grown bulbs, and bulbs from the Bellingham garden are tested each spring on the grounds of the Department for comparison. These tests indicate that the American-grown bulbs not only give more vigorous plants and better blossoms, but are from a week to 10 days earlier than imported bulbs of the same varieties.

Perhaps one of the most valuable features of the distribution is the sending out of seed of improved varieties of cotton, many of them developed during the past 10 or 12 years by the cotton specialists of this Bureau. From 12,000 to 16,000 packages are sent out annually on congressional requests. Prior to 1909, 6 to 12 varieties were distributed annually, but since that year the distribution has been confined to 4 or 5 of the purest strains of improved types. The distribution last spring included the Columbia Long Staple, the Hartsville, and the Dixie Wilt-Resistant for the cotton-growing States east of the Mississippi and in the boll-weevil territory to the west, the Lone Star, a variety which has proved especially well adapted to Texas and Oklahoma.

Seed of 24 varieties of tobacco, grown from plants selected by the tobacco specialists of the Bureau and suitable for the various tobacco-growing sections of each State, have been distributed for several years. The distribution of these improved types has undoubtedly been of much benefit to this great industry.

Another and very popular feature of the distribution is the sending out annually of about 20,000 packages of lawn grass seed mixture of the best quality obtainable, composed of Kentucky bluegrass, 80 per cent; redbud, 15 per cent, and white clover, 5 per cent by weight.

The growing importance of the beet-sugar industry in this country and the dependence of the farmers and factories upon Europe for their supply of seed led the Department a few years ago to include several thousand pounds of improved strains of sugar-beet seed in the congressional distribution and to make careful tests of the seed of the different varieties in sections where it seemed probable that beet seed could be produced successfully, with a view not only of obtaining American-grown seed for the distribution but of encouraging the establishment of a new and profitable industry.

For many years, also, large quantities of grass seeds, alfalfas, vetches, clovers, sorghums, cowpeas, soy beans, and other valuable field and forage crop and miscellaneous seeds have been tested by careful growers in the field and distributed upon congressional requests and to collaborators of the department. The distribution of these seeds has undoubtedly led to their cultivation in communities where before they were practically unknown; has tended to encourage the diversification of crops, especially in the South and West; and has greatly extended the area in which such crops form a part of the regular farming system.

The miscellaneous field seeds are tested for purity and viability in the Seed Laboratory and for trueness to varietal type and adaptation on the trial grounds of the Department and in the field, the same as vegetable seed. In connection with this class of seeds, special equipment is maintained for fanning, cleaning, and fumigating whenever necessary.

The principal sections in the United States where the field seeds mentioned in the preceding paragraph are grown are shown in figure 9.

INTRODUCTION OF RARE SEEDS AND PLANTS.

As already pointed out, when the seed distribution was first established it was mainly with the idea of securing new and rare seeds and plants from foreign countries for introduction and distribution in this country. The original intent of the law was never lost sight of, notwithstanding the great increase in the quantity of standard, well-known varieties required to meet the demand. Seeds and plants of many valuable crops and fruits were introduced from abroad which were rare, new, or little known in the United States. Among these may be mentioned new varieties of sorghum, Kafir corn, rice, oats, barley, wheat, and other cereals and forage crops, peaches,

pears, plums, grapes, and small fruit, as well as subtropical fruits, among which the Washington Navel orange is deserving of special note. Most of this material was purchased from foreign dealers and correspondents or obtained through American consuls in different parts of the world. Prior to 1898 the introduction of rare or new seeds and plants was conducted as a part of the regular work of the Seed Division.

Soon after the inauguration of his administration Secretary Wilson saw the importance of building up the home plant industries through explorations in foreign countries and the introduction of new crops here. He succeeded in 1898 in getting \$20,000 of the regular seed appropriation set aside for the introduction work, and has been active ever since in pushing this work through the Office of

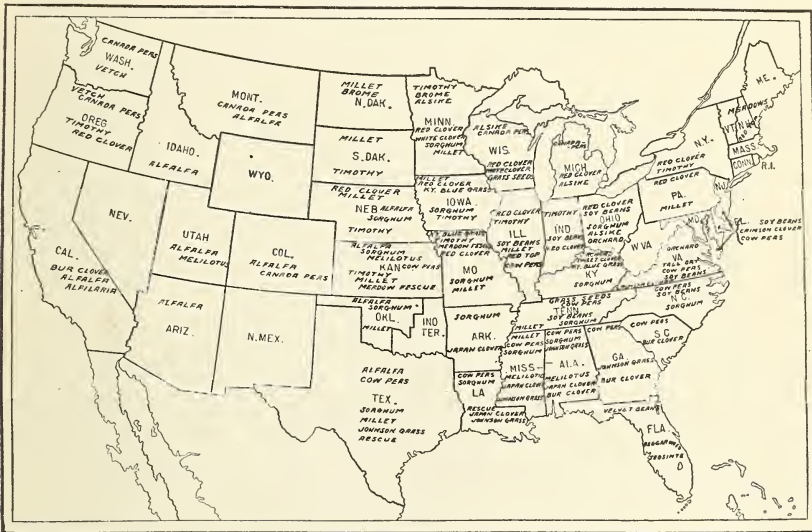


FIG. 9.—Map of the United States, showing the principal sections where grass and forage seeds are grown.

Foreign Seed and Plant Introduction of the Bureau of Plant Industry. This office is now spending about \$52,000 annually.

In addition to securing rare plants and seeds through correspondents and American consuls abroad, it has been the practice of the Department since the establishment of the above-mentioned office to send out trained agricultural explorers into almost every region of the globe where plants of value to American agriculture are likely to be found. Among the successful explorers and expeditions may be mentioned the following:

Mr. David Fairchild has traveled extensively in Europe, Asia, Africa, Australia, and South America, secured seeds and plants of many valuable fruits, grains, vegetables, forage grasses, and

ornamentals, and put the office in touch with the best foreign agricultural institutions in all the countries through which he traveled.

Prof. N. E. Hansen has made four trips to Russia, Siberia, and Turkestan, in the years 1897, 1906, 1908, and 1910, and obtained seed of drought and cold resistant alfalfas, clovers, and vetches for introduction into the Northwest.

The late Dr. S. A. Knapp visited Japan in 1898 and again in 1901 and procured quantities of the short-kerneled native rice, the cultivation of which has since grown into an industry in Louisiana.

Mr. M. A. Carleton, former cerealist of this bureau, was sent to Russia in 1898, and again in 1900, in search of a rust-resistant wheat and brought back large quantities of the drought-resistant durum and other varieties of wheats, oats, and other cereals.

Dr. Ernst A. Bessey in 1902 and 1903 visited Turkestan, the Caucasus, and parts of Russia, where he secured large quantities of Turkestan alfalfa and other seeds.

Mr. Walter T. Swingle was sent to Smyrna, where he studied the Smyrna fig industry in the year 1898, and in 1899 and 1900 to North Africa, where he discovered valuable forage plants and where he procured (in Algeria) the large number of palms which started the date plantations of the Southwest.

Mr. T. H. Kearney, in the winter and spring of 1902-3 and again in 1904-5, explored portions of North Africa and procured large numbers of date palms and considerable quantities of valuable forage-crop seeds for introduction.

Mr. O. F. Cook, who explored portions of Mexico and Central America in 1904 and 1905 in search of a boll-weevil-resistant cotton, procured for introduction seeds of native cottons and corns which formed the basis of his most valuable researches in cotton and corn breeding.

Mr. Frank N. Meyer spent the three years from 1905 to 1908 in China and Manchuria exploring portions of the country never before seen by white men and sending home many hundred selected species or varieties of seeds and cuttings of rare plants and fruits. Among the valuable things secured on this expedition were the Chinese seedless Tamopan persimmons, some remarkable hardy varieties of yellow roses, a new dry-land stock for stone fruits, and the Chinese tsaos, or jujubes. Mr. Meyer has just returned from an exploration of nearly three years of the dry and cold regions of central Asia, including the little-known Chinese Turkestan. He went in search of plants for the cold dry Northwest and sent back, among the several hundred living plants he collected, some remarkable dry-land poplars, new and valuable shipping varieties of table grapes, hardy wild apples and apricots, a remarkable hardy olive, and a most valuable collection

of the wild forage legumes of the Siberian steppes, some of which have already been incorporated into new varieties for field trial. (See fig. 10.)

TESTING, PROPAGATION, AND DISTRIBUTION.

The material which comes in from these expeditions and from correspondents all over the world at the rate of 10 shipments a day is either sent to the plant introduction gardens of the office, turned over to the specialists of the Department, or distributed to carefully selected expert growers, who are in a position to give them a fair trial and report the results. (See fig. 11.)



FIG. 10.—Caravan of Mr. Frank N. Meyer, agricultural explorer, on his way to the cold semidesert region of the Wutaishan in North China.

The plant introduction gardens, maintained for purposes of the propagation and preliminary testing of material, comprise the garden at Miami, Fla., for plants which thrive only below the frost line; the garden near Brooksville, Fla., for the bamboo and other oriental plants in particular and for plants which will withstand some frost; the garden at Chico, Cal., for the propagation of a wide range of material from all over the world on a large scale; and the upper Mississippi Valley garden at Ames, Iowa, for specially cold-resistant plants. (See fig. 12.)

Mention should also be made of the date-introduction gardens at Phoenix, Tempe, and Yuma, Ariz., and at Mecca and Indio, Cal., which were inaugurated by the Office of Foreign Seed and Plant In-

production and where are growing the date palms introduced from the Old World by Messrs. Swingle, Fairchild, and Kearney. These gardens have now the most complete collection of date varieties in the



FIG. 11.—A shipment of date offshoots as it arrived from Bagdad, Arabia. These are now growing in southern California and Arizona.



FIG. 12.—An orchard of stone fruits at the Plant Introduction Garden, Chico, Cal., grafted on the wild Chinese peach.

world. These orchards are coming into bearing, and it is only a question of a few years when American-grown dates will be sold on our markets.

SOME RESULTS OF THE INTRODUCTION OF NEW SEEDS AND PLANTS.

Among the hundreds of new varieties of seeds and plants introduced from foreign countries since the organization of the Office of Foreign Seed and Plant Introduction, as well as before that systematic work was begun in 1898, some have proved of great economic importance and of enormous value to the country. Within the limits of this circular it would be impracticable to mention more than a few of the most striking examples.

Sorghum.—Introduced from China and France in 1864 at a cost of about \$2,000. Sorghum is now grown throughout the United States, and the annual value of the crop is estimated at \$40,000,000.

Kafir corn.—Introduced at a cost of not more than \$5,000. Largely grown in the semiarid Southwest, where but few other crops are successful. Estimated value of the crop per annum about \$15,000,000.

Durum wheat.—Cost of introduction probably less than \$30,000. Its cultivation has extended rapidly throughout the semiarid Northwest, and the annual value of the crop probably exceeds \$40,000,000.

Japanese short-kerneled rices.—Introduced at a cost of less than \$20,000. Assisted materially in the phenomenal growth of the rice industry in Texas and Louisiana. Estimated value of annual increase in the product, \$3,000,000.

Swedish Select oats.—Cost about \$5,000 to introduce. Estimated increase in annual value of this variety in Wisconsin alone, \$1,000,000.

Excelsior White Schoenen oats.—Introduced in 1868 at a cost of not more than \$1,000. Value of estimated annual increase, \$15,000,000.

Chevalier barley.—Distributed by the Department in 1871. Cost probably not in excess of \$1,000. For many years one of the standard varieties in the United States, the crop of which is worth many millions of dollars.

Fultz wheat.—Introduced by the Department in 1871 at small cost. Became one of the standard varieties in the East, and the annual value of the crop amounts to millions of dollars.

Washington Navel orange.—Original cost of this introduction not on record, but probably insignificant. Value of the California crop alone in excess of \$10,000,000 annually.

While, naturally, it is quite impossible to estimate accurately the actual value of these various introductions, they have the positive value which a better yielding variety always has—a permanent increase in the wealth of the country—and it is not too much to state that they have already increased the wealth of the country since their introduction by many times what they have cost the Government to introduce.

SUMMARY.

(1) The purchase and distribution of seeds by the Government, which began in 1839, laid the foundation for the establishment of the present Department of Agriculture.

(2) One of the two fundamental duties of the Department of Agriculture, as prescribed in the organic law (sec. 520, R. S.), is to "procure, propagate, and distribute among the people new and valuable seeds and plants."

(3) The Department of Agriculture soon found that it was impracticable to procure sufficient *new* seeds and plants to carry on the distribution authorized annually by Congress and was compelled to purchase increasing quantities of standard varieties of well-known value in order to meet the demand.

(4) In 1896 the law requiring the purchase and distribution of seeds, including vegetable and flower seeds, and the expenditure of not less than a specified sum for that purpose was made mandatory, and in 1898 a specified sum was expressly set aside for procuring rare and valuable seeds from foreign countries, legislation which has been periodically reenacted to the present day.

(5) Prior to 1898 the procuring of new and rare seeds and plants from foreign countries was carried on in a desultory manner, but resulted, nevertheless, in the introduction of a few crops and fruits of great economic importance, crops the value of whose yearly harvest exceeds the entire cost of the congressional seed distribution from its origin to the present time.

(6) Beginning with 1898, the work of introducing, testing, propagating, and distributing new and valuable seeds and plants from foreign countries was systematized and regular exploring expeditions have been organized and sent out to several of the promising fields in different parts of the globe.

(7) The value of the congressional seed distribution consists in the wide distribution, through Senators and Members of Congress, to applicants in all parts of the country of standard varieties of garden seeds of known value and of the best quality; also seed of improved varieties of cotton, tobacco, alfalfa, clover, sorghum, the grasses, cowpeas, fruits, and miscellaneous plants; and further in encouraging the production in this country of seeds, bulbs, and plants largely or wholly obtained from abroad, by contracting with American growers to furnish such seeds and plants for congressional distribution.

(8) The value of foreign seed and plant introduction work consists in procuring, introducing, testing, propagating, and distributing new, rare, or little-known seeds and plants from foreign countries,

in determining their adaptability and value in different sections of the country, in establishing new plant industries, and above all in finding among the thousands of new plants introduced annually one or more which may add enormously to the wealth, comfort, and happiness of the people.

Approved:

JAMES WILSON,

Secretary of Agriculture.

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